

Opening Remarks

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**DO Collaboration Meeting
October 2003**



Run IIb

- As you know, despite our strong arguments to the contrary, the Director decided to terminate the silicon detector upgrades
- This was not the decision we wanted or one we necessarily agree with, but we have to face the reality that
 - This is the decision
 - The director has the right to make this decision
 - Much of the HEP community thinks the director did the right thing
- I believe there is no likelihood the decision is will be reversed
 - We have talked to PAC, DOE, NSF, HEPAP, P5, URA ...
- We outlined a lot of bad things that might follow
 - The “spiral of death”
 - Now we have to work hard to ensure that these predictions do not come true



What should we do?

1. Emphasize the physics

- We are sitting on data: this is our trump card
- Talk up our results and our program
 - Fermilab result of the week
 - (thanks to Paul Padley)
 - DØ tour area
 - (thanks to Greg Snow, Breese Quinn, Sherry Towers)
 - Go out and give talks!



2. Ensure that we do not see a decline in support

- We have assurances from Robin Staffin (DOE) and Joe Dehmer (NSF) that Run II remains highest priority for university groups
 - Visits from Staffin this week, Dehmer in November
- Same message from P5, HEPAP
- Within the lab, need to keep pressure on Tevatron luminosity
 - This is supposed to be what benefits from resources made available by the silicon cancellation (not BTeV)
- Must do our best to hold everyone to these statements

If we want the community to stand behind this program, we have to show that we are fully committed to it ourselves

- Ensure we take the best data that we can
 - Show support for operations
 - Show support for software development
 - Show support for reconstruction (local and remote)



3. Explore a silicon layer 0

- Looks as if it can indeed mitigate an eventual loss of Layer 1 for tracking, but
 - technical issues are not trivial
 - need to be sure we have the people required to pull this off
- Workshop on 9/26 focused effort on a 6-fold design using analog cables and SVX4 readout
- Lots of work in progress – more details this week



New Physics Results

- We presented a wide array of new results at Lepton-Photon:
- masses, or scale limits
 - $M(B_d^{**}) = 5.71 \pm 0.016 \text{ GeV}$
 - $m(\chi_0^1) > 80 \text{ GeV}$
 - $m_{1/2} > 150 \text{ GeV}$
 - $M_S(\text{GRW}) > 1.28 \text{ TeV} (ee/\gamma\gamma)$
 - $M_S(\text{GRW}) > 0.88 \text{ TeV} (\mu\mu)$
 - $M_{LQ}(\mu\mu) > 184 \text{ GeV}$
 - $M_{LQ}(e\nu) > 159 \text{ GeV}$
 - $M_{LQ}(ee) > 231 \text{ GeV}$
 - $M_{Z'}(ee) > 719 \text{ GeV}$
 - $M_{Z'}(\mu\mu) > 620 \text{ GeV}$
 - $M(H^{\pm\pm}) > 115 \text{ GeV}$
- BR and R
 - $\text{BR}(B_s \rightarrow \mu\mu) < 1.6 \times 10^{-6}$
 - $R_{W/Z} = 10.34 \pm 0.35 \pm 0.48$
- lifetimes
 - $\tau(\text{incl. } B) = 1.562 \pm 0.013 \pm 0.045 \text{ ps}$
 - $\tau(B^+) = 1.65 \pm 0.083^{+0.096}_{-0.1233} \text{ ps}$
 - $\tau(B_d) = 1.52^{+0.19}_{-0.17} \text{ ps}$
 - $\tau(B_s) = 1.19^{+0.19}_{-0.14} \text{ ps}$
 - $\tau_{\Lambda b} = 1.05^{+0.21}_{-0.18} \pm 0.12 \text{ ps}$
 - $\tau(B \rightarrow D \gamma) = 1.46 \pm 0.08 \text{ ps}$
- cross sections, or limits
 - $\sigma(t\bar{t}) = 8.1^{+2.2}_{-2.0} {}^{+1.6}_{-1.4} \pm 0.8 \text{ pb}$
 - $\sigma(Z\mu\mu) = 261.8 \pm 5.0 \pm 8.9 \pm 26.2 \text{ pb}$
 - $\sigma(Z\tau\tau, \pi\text{-type}) = 235 \pm 137 \text{ pb}$
 - $\sigma(Z\tau\tau, \rho\text{-type}) = 222 \pm 71 \text{ pb}$
 - $\sigma(W+bb) < 33.4 \text{ pb}$
 - $\sigma^* \text{BR}(H \rightarrow WW \rightarrow ee/e\mu) < 0.45 \text{ to } 2.8 \text{ pb}$
 - $\sigma^* \text{BR}(H \rightarrow WW \rightarrow \mu\mu) < 0.2 \text{ to } 0.7 \text{ pb}$

Big thanks to Boaz Klima and the outgoing physics and ID group convenors!



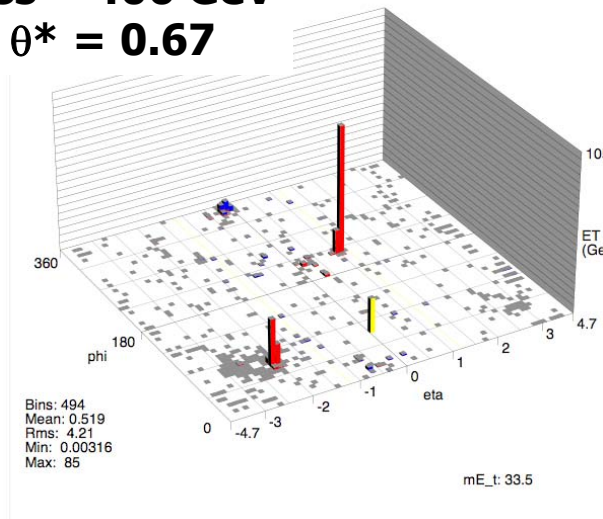
Searching for Extra Dimensions

- Signal would be an excess of ee , $\mu\mu$, $\gamma\gamma$ events at large mass and large angle, due to virtual graviton exchange

High-mass electron pair event

mass = 406 GeV

$\cos \theta^* = 0.67$



DØ limits from $\bar{p}p \rightarrow ee, \mu\mu, \gamma\gamma$ (Summer 2003)

$M_s(\text{GRW}) > 1.28 \text{ TeV}$ (128 pb⁻¹, 95% CL)

$> 1.37 \text{ TeV}$ (Run I + Run II combined)

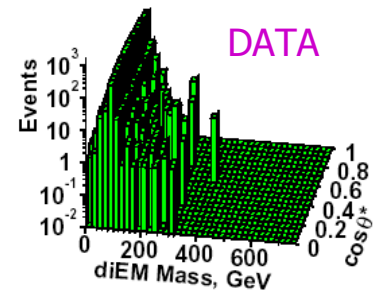
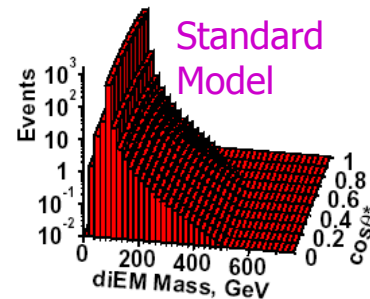
most stringent limit to date on large extra dimensions

$\bar{p}p \rightarrow ee$ and $\gamma\gamma$

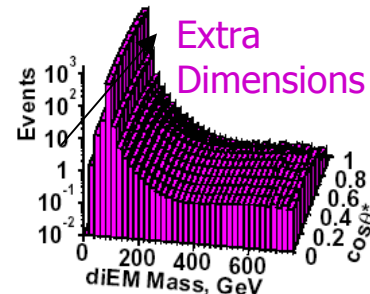
SM Prediction

DØ Run II Preliminary

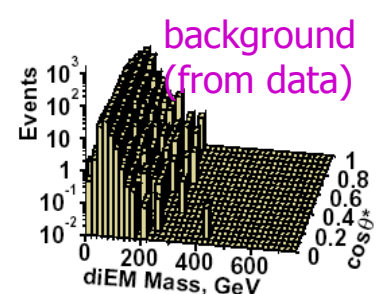
Data



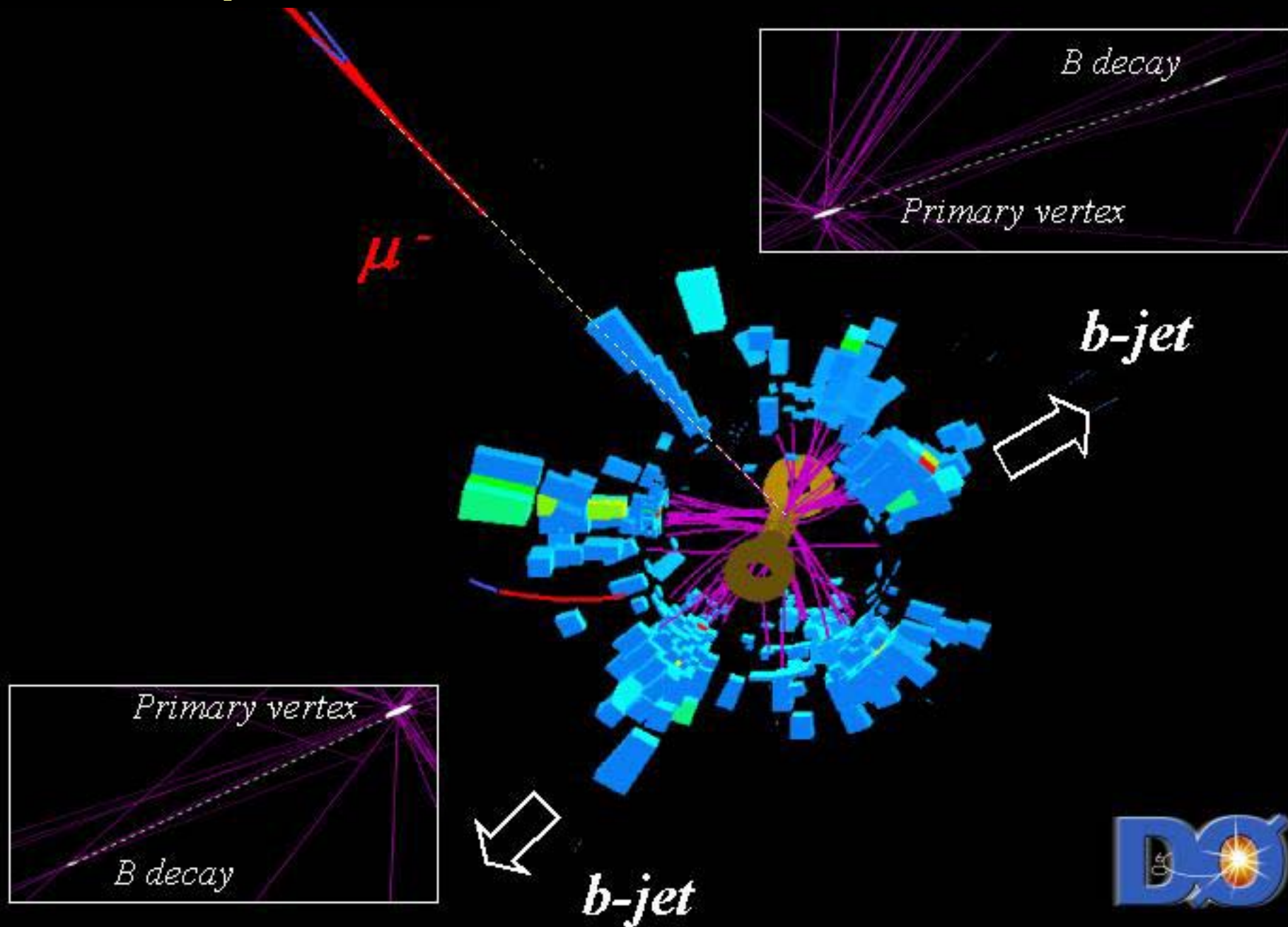
ED Signal



QCD Background



Run II top candidate

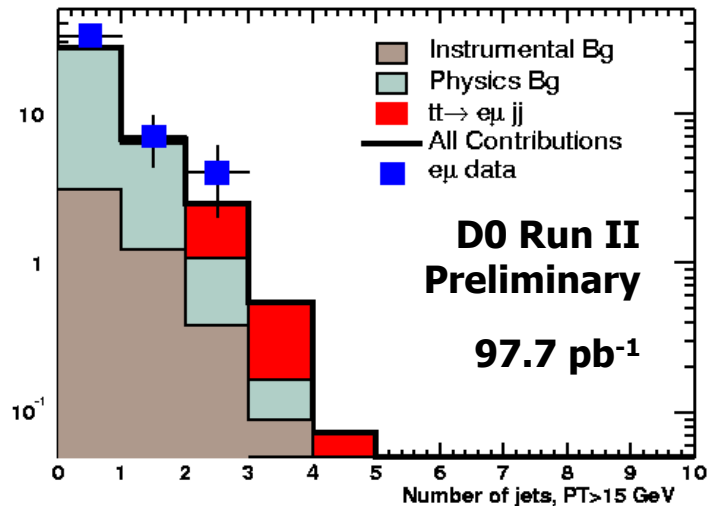
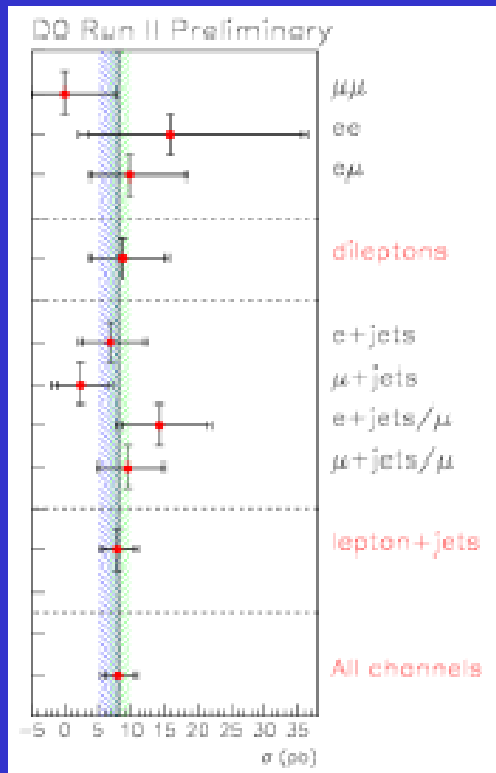


Top Production Cross Section

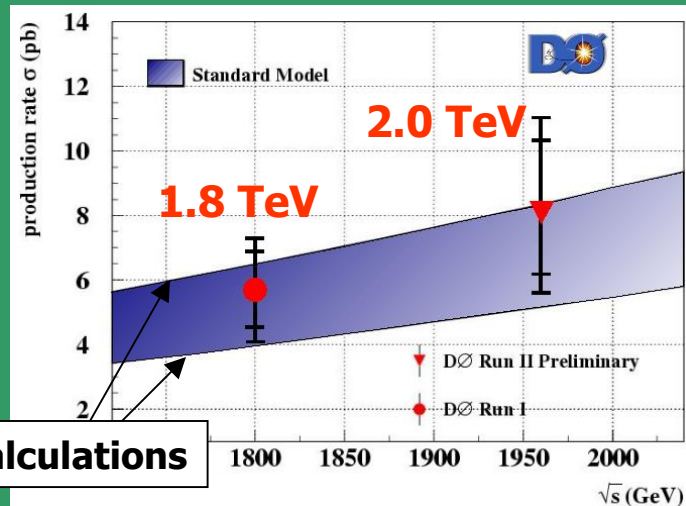
We measure

$$\sigma = 8.1^{+2.2}_{-2.0} (\text{stat})^{+1.6}_{-1.4} (\text{syst}) \pm 0.8 (\text{lumi}) \text{ pb}$$

Is it consistent across all the various decay modes of the top quark?

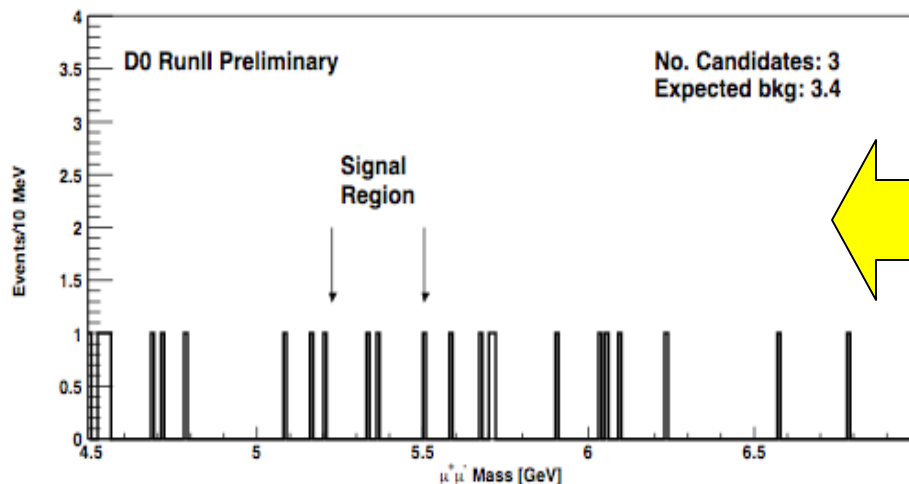
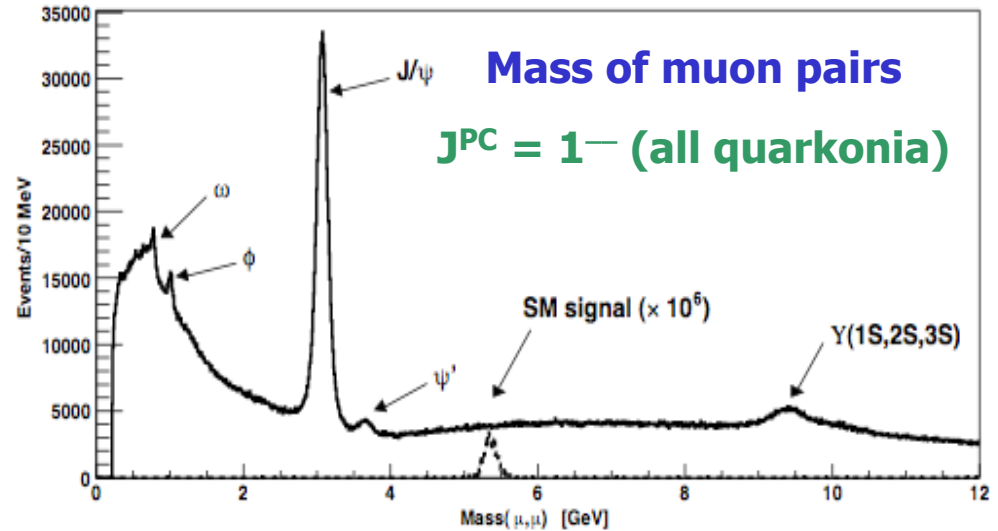


Is it as expected from QCD?



Indirect searches for new particles

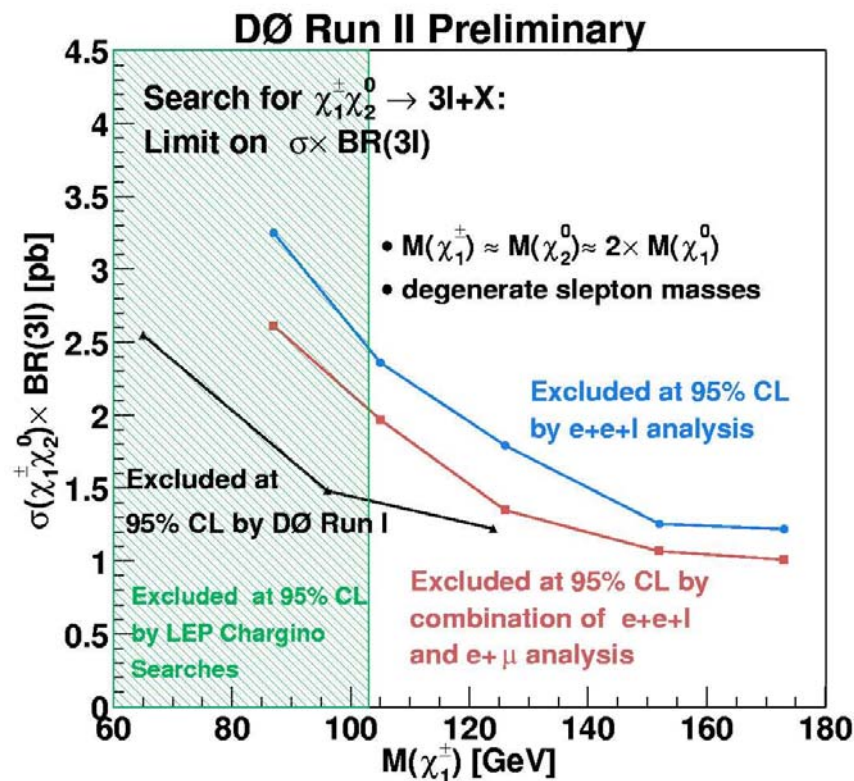
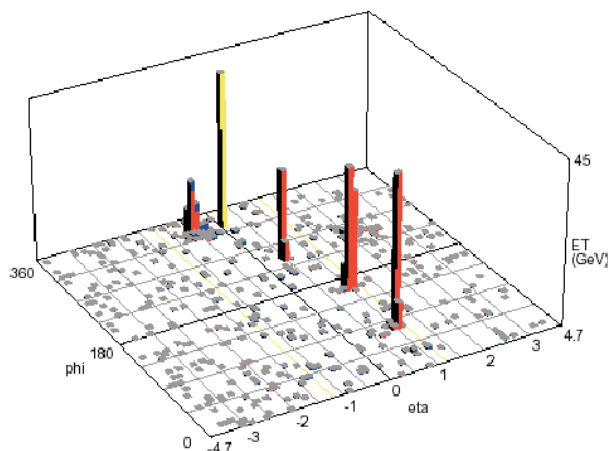
- Measure the rate of the rare decay $B_s \rightarrow \mu^+\mu^-$
- In the Standard Model, cancellations lead to a very small branching ratio
 - SM BR = 3.7×10^{-9}
- New particles (e.g. SUSY) contribute additional Feynman diagrams, increase BR
 - up to 10^{-6}



- In 100pb^{-1} of data, after all cuts, in B_s mass region
 - Observe 3 events
 - Expect 3.4 ± 0.8 background
 - $\text{BR}(B_s \rightarrow \mu^+\mu^-) < 1.6 \times 10^{-6}$ (90% CL)
cf. 2.0×10^{-6} (PDG)

Chargino/neutralino production

- “Golden” signature
 - Three leptons
 - very low standard model backgrounds
- Increasingly important as squark/gluino production reaches its kinematic limits (masses $\sim 400\text{-}500\text{ GeV}$)
- Reach on χ^\pm mass
 - $\sim 180\text{ GeV}$ ($\tan\beta = 2, \mu < 0$)
 - $\sim 150\text{ GeV}$ (large $\tan\beta$)



Message for the public:
We have entered unexplored territory
in terms of sensitivity to new physics

Message for us:
We need to do much better!

Physics Plans

- **New organization and new convenors in place**
 - **Lots more in next talk...**
- **Immediate focus: data processing/reprocessing**
 - **New Common Samples group**
 - **P13 TMB fix**
 - **P14 processing**
 - **We do not believe we can be sure of enough resources to reprocess all the $P < 14$ data on the timescale we want**
 - Though much effort is underway to improve reco speed, address farm hang-ups, and increase facilities available (e.g. Brazil)
 - **At Fermilab: process from RAW data during shutdown**
 - **At remote sites: select $\sim 30\%$ of data (leptons...) based on P13 DST and reprocess with P14**
 - **For the future**
 - **Streaming**
- **Note new physics meeting/9th Circle schedule is now in effect**

I/we want to see publications this year!



Other News

- **New responsibilities**

- **Calorimeter: Nirmalya Parua → Robert Zitoun**
- **Online Global Monitoring:
Pushpa Bhat → Elliot Cheu and Michiel Sanders**
- **Offline Shifts: Kin Yip → Daria Zieminska**

- **Office Space**

- **We accept the recommendations of the committee**
 - **see the internal documents page for details and schedule**
 - **Thanks to Rick Jesik, Jason Kasper, Ron Lipton, Christophe Royon, and Linda Stutte (chair)**
- **New video room DAB3 is under construction**
 - **Video equipment provided by IN2P3**
 - merci bien, messieurs!



Other News (2)

- **Tevatron Magnet survey work during shutdown**
 - Thanks to Rich Smith, Tamsin Edwards, Mike Strang, Len Christofek, Pierrick Hanlet, Petros Rapidis, Michael Weber
- **DØ shutdown work is going well**
 - More details this week
 - Level 2 Trigger is now a 100% beta system
 - Calorimeter noise – painful, but progress, understanding
- **Workshops held earlier this week on two high priority areas:**
 - **Calorimeter**
 - Zitoun and Bernardi presentations on Friday
 - **Grid (followup to Beaune)**
 - Lueking this morning



Summary

- If there is a message for this week, both from within the collaboration and from the Run IIb outcome, it is a reminder that we must focus on **getting the most out of our ongoing program**
- Importance of
 - Detector operations
 - Data quality
 - Reconstruction, re-reconstruction (remote facilities)
 - Physics results
 - Doing well, but must do better (and must publish)

